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NATURAL DISASTER REDUCTION: INTERRELATIONSHIPS BETWEEN TECHNOLOGICAL AND NATURAL HAZARDS

Technical session

Natural and technological catastrophes and policy options: a review of some experiences

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1. Many people have long understood, at least intuitively that continuing natural and technological (Na-Tech) catastrophes and the consequent environmental degradation will eventually exact a heavy economic toll and have a strong negative influence on the process of development. Unfortunately, no global economic models incorporate the depletion and destruction of the earth's natural support system. Only now we can begin to piece together information from several recent independent studies to get a sense of world-wide economic and social effects of Na-Tech hazards. In the meantime, there is a very complex interrelationship between natural and technological hazards, the comprehension of which is of basically importance to identify correct models of industrialization based on a global and safe environmental perspective.

2. Planning, mitigation and response are the main aspects to consider in a correct political perspective. Planning is looking forward (development), mitigation is looking backwards (to reduce effects on existing man-made structures and population), while response includes the capability of the social system to react to Na-Tech catastrophes (prevention, preparedness,

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post-disaster operations etc.). In planning aspects we have to consider that the expected output (hazard maps, microzoning maps, site selections) depend on the scale of the problem and on the scope:

(a) A regional scale requires hazard maps (e.g., the Italian project for the definition of areas that are identified as unsafe for energy power plants, in the light of different natural hazards and the technological consequences) that are mainly based on a long-term history of natural processes (i.e., the evolution of natural phenomena through geological, archaeological, historical and early instrumental investigations, during the quaternary - the past 2 million years - and particularly focused on the alocene - the past 10,000 years);

(b) A local scale requires the realization of microzoning map (e.g., the Italian experience after the 1980 Irpinia earthquake, or the studies of Rome) that are also based on a long-term history of natural processes, on geological, geomorphological, geophysical and other investigations and on an analysis based on past or recent post-disaster field surveys to check the expected theoretical results;

(c) Site selection requires specific experimental investigations to understand the behaviour of soil under seismic load (e.g., the ENEA project in Gioia Tauro plain in southern Italy which is to define the vertical modification of seismic signal due to geological and geotechnical elements in vertical array) and, in general, to understand the capability of hosting high-risk plants (e.g., the investigations for siting of nuclear power plants). Particular attention must be paid also to the mitigation of major accidents (for instance, the "Seveso" directive which emanated from the European Union).

3. In the meantime, parallel to technical operations, it is important to carry out a socio-economic impact analysis of technological and natural hazards. This should take into account: a global perspective of natural and technological hazards; a dynamic perspective; the demographic explosion of developing countries and, over all, the urban explosion which is dramatically outpacing every master plan of development, even after a few years (half a billion people live in cities today, a figure which is expected to double in the next 20 years); the promotion of environmentally sustainable development; environmental protection policies which, in the short term, may lead to a slower growth of income per head and which would be necessary to ensure the long-term sustainability of income growth and improvements in the quality of life. Because employment is a key factor in environmental degradation processes, particularly in the least developed countries, the central role of employment creation in the environmental processes should be emphasized by introducing a new operational concept of sustainable development.

4. The implementation of the above-mentioned action requires an effective communications system addressed to public participation. Very important also is the interaction among public administration (central and local), industry and the scientific community (ENEA was able to realize this in specific projects throughout Italy).

5. The realization of the various output proposed (hazard maps, microzoning maps, site selection) cannot be performed in a crude analytical way; it requires a certain degree of professional judgement, another important component of the mechanism. In practice, we have to consider that there are still many uncertainties and we cannot overcome all doubts by using sophisticated computer equipment and software. Only a disciplined collection of data, interpretation and professional judgement can support high quality computer elaborations.

6. Finally, emphasis must be placed on the role of the international community (technical and political) in supporting countries afflicted by Na-Tech disasters and in transferring experience and methodologies in planning and mitigation. In this regard, United Nations coordination efforts will be essential.